

Quality Assurance Guidelines
For Information Resources Projects in
Texas State Agencies

**Process for Determining
The Benefits and Costs
Of Information Resources Projects**

*V 1.0 Initial Release
2/1/00*

Table of Contents

1. PURPOSE OF THE PROCESS	3
2. SCOPE OF THE PROCESS.....	3
2.1 ACTIVITIES TAILORING.....	3
2.2 ROLES TAILORING.....	4
2.3 DELIVERABLES TAILORING.....	4
3. ROLES IN THE PROCESS.....	5
4. GRAPHICAL OVERVIEW OF THE PROCESS	6
5. ACTIVITY DESCRIPTIONS	7
5.1 REVIEW/DEFINE PROJECT OBJECTIVES, ASSUMPTIONS AND CONSTRAINTS.....	7
5.2 IDENTIFY/REVIEW ALTERNATIVE SOLUTIONS.....	8
5.3 UPDATE ESTIMATE OF BENEFITS AND COSTS.....	8
5.4 COMPARE ALTERNATIVE SOLUTIONS	9
5.5 REVIEW RESULTS AND SELECT /MODIFY COURSE OF ACTION	11
6. MEASURES OF THE BENEFITS AND COSTS ANALYSIS PROCESS	12
7. VERIFICATION ACTIVITIES	12
8. DOCUMENT CONTROL.....	12
A. ADDITIONAL RESOURCES	12
B. SUPPORTING TEMPLATES	13
C. SUPPORTING CHECKLISTS	13

1. PURPOSE OF THE PROCESS

This process is to be used for monitoring and revising benefit and cost information as projects are implemented. Initial development of this information is assumed a part of the agency's preparation of its Biennial Operating Plan (BOP). Therefore, this process considers the existence of such information as a precondition for entry into the process.

When a project is initially proposed, there are many uncertainties in both the expected benefits and the estimated costs. Thorough risk analysis can help identify the impact of such uncertainties. In general, however, experience has shown that benefits are usually overestimated, while costs are usually underestimated. This mandates the re-estimation of both benefits and project budget at critical points during the project's implementation. Each time this is done, the range of uncertainty should be smaller.

As time passes, and as a project reaches the end of each development phase, changes in the agency's business environment may cause changes in the project's objectives, assumptions, and constraints to change. Evolution of technical information about the information resources system being developed will likely make cost data more precise. It may also change the shape of the solution being looked at, causing drastic revision of cost projections. For all of these reasons, the business case for continuing with development should be periodically reviewed, necessitating the use of this process.

2. SCOPE OF THE PROCESS

The activities in this process are iterative throughout the project, and therefore the nature of the tasks in each activity is dependent on where in the project life cycle they occur. The amount and range of uncertainty in project data will vary greatly as the project progresses. Accordingly, the activity names suggest both an initial pass through the process, as well as an update effort that may occur several times during the project. As with risk management, it is important to include the data from this process, as well as process improvement ideas, in the post project review, described separately in the *Process for Post Project Reviews*.

For further guidance on tailoring a process based on project characteristics, see *Tailoring the Guidelines* elsewhere in this manual.

2.1 ACTIVITIES TAILORING

The activities in this process may be done slightly differently for different types of projects. The following tailoring tables provide suggestions for adaptation. In addition, there is some tailoring of the specific data being handled and sources of input, based on when in the life cycle of a project the costs and benefits are being identified; suggestions are included in the checklists.

Activity	Medium QA Focus	High QA Focus
Review/ Define Project Objectives, Assumptions and Constraints	May be documented in memo, included in Project Development Plan	Developed in facilitated sessions; included in Project Development Plan
Identify/ Review Alternative Solutions	May be documented in memo, included in Project Development Plan	Developed in facilitated sessions; included in Project Development Plan
Update Estimate of Benefits and Costs	Draft document reviewed by small group; summary data included in Project Development Plan	May be developed in facilitated sessions; supported with analysis tools; attachment to Project Development Plan
Compare Alternative Solutions	Draft document reviewed by small group; summary data included in Project Development Plan	May be developed in facilitated sessions; supported with analysis tools; attachment to Project Development Plan
Review Results and Select/Modify Course of Action	Steering Committee usually has authority to make decision; documented in Project development Plan	Steering Committee makes recommendation to senior Management; documented in Project development Plan

2.2 ROLES TAILORING

Those involved with performing or reviewing cost/benefit analyses will be working in their normal roles. No new or special versions of those roles are likely to be required.

2.3 DELIVERABLES TAILORING

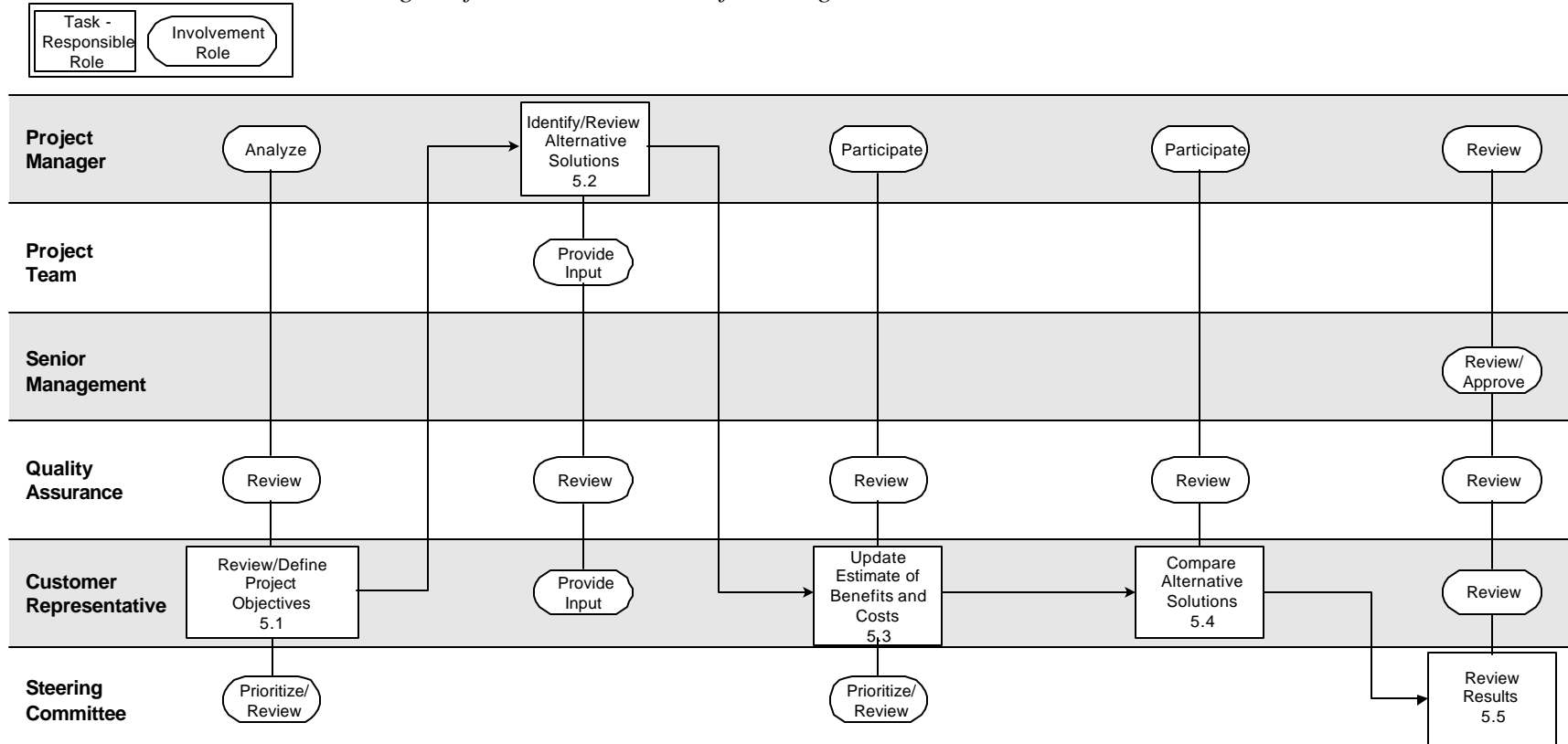
Activity Deliverable	Medium QA Focus	High QA Focus
Benefits and Costs	Summarized in Project Development Plan	Attachment to Project Development Plan; contains itemized benefits and costs, with supporting analysis models
Rank-ordered Alternative Solutions	Section of Project Development Plan	Section of Project Development Plan; includes scoring mechanism; contains supporting analysis models

3. ROLES IN THE PROCESS

Role Names	Role Definitions
Project Management	<ul style="list-style-type: none"> • Provide input on technical feasibility of alternatives • Provide cost data on the implementation of each alternative • Represent the Project Team in reviewing work products • Develop an understanding of the desired benefits and communicate this to the Project Team
Customer Representative	<ul style="list-style-type: none"> • Drive the identification and quantification of benefits • Represent customer interests in reviewing work products • Provide input on business feasibility of alternatives • Develop an understanding of the alternative solutions and communicate this to the customer community
Project Team	<ul style="list-style-type: none"> • Provide input on the technical viability of alternative solutions
Quality Assurance	<ul style="list-style-type: none"> • Review the quality of work products • Monitor execution of the process against the specifications of this guideline
Steering Committee	<ul style="list-style-type: none"> • Review recommendations and assign priorities to benefits and alternatives • Make decision on preferred alternative • Provide oversight of this process
Senior Management	<ul style="list-style-type: none"> • Review and approve recommended alternative solution

4. GRAPHICAL OVERVIEW OF THE PROCESS

Note: The numbers in each rectangle refer to activities in the following section.



5. ACTIVITY DESCRIPTIONS

The following sections provide details on each activity: a description of the purpose, entry and exit criteria, and the sequence of tasks to be done. Tasks are shown along with the roles generally responsible and/or involved in those tasks.

5.1 REVIEW/DEFINE PROJECT OBJECTIVES, ASSUMPTIONS AND CONSTRAINTS

An objective is the decision or result the decision-maker wants the project to achieve. Objectives are usually the result of trying to solve a problem or trying to take advantage of an improvement opportunity. Project objectives should always be reviewed with the managers who will approve the project.

Assumptions are explicit statements used to describe the present and future environment. All assumptions must be identified and documented so the decision-maker realizes the basis for alternatives. Constraints limit the scope and content of available alternative solutions.

Purpose: To formulate/review project objectives, assumptions, and constraints that that affect the estimates of benefits and costs.

Entry Criteria: • Some level of BOP planning data exists

Roles	Tasks
Customer Representative	<ul style="list-style-type: none">• Add/change/delete statements of project objectives• Add/change/delete assumptions and constraints
Customer Representative, Project Manager	<ul style="list-style-type: none">• Analyze project objectives for<ul style="list-style-type: none">- Alignment with organization business goals and requirements- Sufficient detail to allow estimation of costs and benefits- Ability to unambiguously determine success
Steering Committee, Project Manager	<ul style="list-style-type: none">• Establish/review priority of each objective
Customer Representative, Project Manager, Quality Assurance	<ul style="list-style-type: none">• Review objectives, assumptions, and constraints for completeness, clarity and accuracy
Steering Committee	<ul style="list-style-type: none">• Review and approve project objectives, assumptions, and constraints

Exit Criteria: • Well-defined project objectives has been agreed on and approved

- Assumptions and constraints have been reviewed and understood by all affected parties

5.2 IDENTIFY/REVIEW ALTERNATIVE SOLUTIONS

Identify all reasonable means for meeting the project objectives. Alternatives should satisfy the minimum requirement of meeting the stated objectives. There is rarely just one way to attain a given objective. For new development projects, a number of alternatives usually exist for meeting a set of information resource requirements, within defined constraints. For maintenance and enhancement projects, there may be only one alternative, or a much smaller range of options.

Purpose: To create/review viable alternatives that meet the given objectives within the specified constraints.

Entry Criteria:

- Prioritized project objectives have been approved
- Assumptions and constraints have documented and reviewed

Roles	Tasks
Project Team, Project Manager, Customer Representative	<ul style="list-style-type: none"> • Identify/review alternatives <ul style="list-style-type: none"> - Hardware - Software - Processes, training, roles development - Acquisition - Implementation
Project Team, Project Manager, Customer Representative	<ul style="list-style-type: none"> • Consolidate weak alternatives into stronger alternatives where possible • Review the alternatives for their ability to meet project objectives within the given constraints, and for technical feasibility

Exit Criteria:

- A list of feasible alternatives has been developed and reviewed

5.3 UPDATE ESTIMATE OF BENEFITS AND COSTS

Benefits and costs associated with the development and operation of each alternative must be determined. When there is an existing automated or manual system, the identification of costs and benefits associated with the present system (status quo) is the starting point for the analysis. The present system (status quo) must always be considered as an option/alternative in this activity. In many cases, additional alternatives can be analyzed as changes to the current system.

Purpose: To quantify the benefits and costs associated with each alternative solution.

- Entry Criteria:**
- Prioritized project objectives have been documented, reviewed and approved
 - Documented assumptions and constraints have been reviewed
 - Feasible alternative solutions have been identified, consolidated and reviewed

Roles	Tasks
Customer Representative	<ul style="list-style-type: none">• Identify/update benefits for each alternative• Analyze and assign values to each benefit
Customer Representative, Steering Committee	<ul style="list-style-type: none">• Prioritize the benefits
Customer Representative, Project Manager	<ul style="list-style-type: none">• Identify/update all pertinent cost factors, including<ul style="list-style-type: none">- Expenses of acquiring the system or resources- Operational costs- Lifetime maintenance costs• Analyze and assign values to each cost factor
Customer Representative, Project Manager	<ul style="list-style-type: none">• Identify/update benefits for each alternative, considering<ul style="list-style-type: none">- Organizational goals, objectives, mission- System function- Operating environment
Project Manager, Steering Committee, Quality Assurance	<ul style="list-style-type: none">• Review benefits and costs for completeness and accuracy

- Exit Criteria:**
- Benefits and costs have identified, documented, and analyzed for each alternative

5.4 COMPARE ALTERNATIVE SOLUTIONS

Once the costs and benefits for each alternative are identified, it is necessary to compare them in common terms, usually present value (PV). The purpose of expressing costs and benefits in terms of present value is to account for the time value of money (i.e., a dollar today is worth more than a dollar in the future).

The first comparison of alternatives is to rank them according to their net present value (NPV). Net present value is calculated by subtracting the total present value cost from the total present value benefit of the project. The higher an alternative's positive net present value, the more its benefits exceed its costs. From an economic analysis point of view, the project with the highest net present value is frequently the most desirable.

Sometimes, however, that may not be the most appropriate decision. Mitigating factors such as different non-quantifiable benefits among the alternatives, large initial cash outlays, budgetary constraints, manpower restrictions, etc., may require selection of an alternative that does not have the highest net present value. In these situations, the alternatives' net present values serve to establish a preliminary ranking of alternatives.

Elements of uncertainty involved in estimating benefits and costs must be examined to determine their effects and influence on the final recommendations. This examination is called sensitivity analysis. The question that a sensitivity analysis asks is "How much difference does it make if the estimates are incorrect?" In other words "How vulnerable are our results to a change in assumptions?" Sensitivity analysis requires recalculating the results using different values for critical assumptions.

Purpose: To develop a rank ordering of alternative solutions based on one or more quantitative evaluation techniques. Evaluate and document the variability of benefits and costs under different sets of assumptions and constraints.

Entry Criteria: • Benefits and costs have been estimated for each alternative solution

Roles	Tasks
Customer Representative	<ul style="list-style-type: none"> • Compute the necessary parameters to evaluate each alternative using the selected method(s)
Customer Representative	<ul style="list-style-type: none"> • Rank order, using each selected evaluation method
Customer Representative, Project Manager	<ul style="list-style-type: none"> • Evaluate and document mitigating factors that might override the quantitative evaluation
Customer Representative, Project Manager	<ul style="list-style-type: none"> • Perform sensitivity analysis on selected inputs if warranted by conditions such as <ul style="list-style-type: none"> - Uncertainty in estimates of benefits or costs - No clear preference among alternatives
Customer Representative, Project Manager, Quality Assurance	<ul style="list-style-type: none"> • Review the results for accuracy and consistency

- Exit Criteria:**
- Alternative solutions have been compared and rank-ordered using a documented procedure
 - Sensitivity analysis has been completed, if appropriate

5.5 REVIEW RESULTS AND SELECT/MODIFY COURSE OF ACTION

Once completed, the results are presented in a standardized, uniform manner. This will organize the findings for management and ensure that all important issues have been addressed. It is important to use standard formats so management can become familiar with techniques used and methods for displaying results. In addition, the formats serve to simplify the presentation of results by clearly showing all data and supporting information.

The obvious decision rule for making an economic choice between several alternatives is to choose the highest net present value. Sometimes, however, that may not be the most appropriate decision. Mitigating factors, as discussed earlier, may require selection of an alternative that does not have the highest net present value. In these situations, the alternatives' net present values serve to establish a preliminary ranking of alternatives.

Purpose: To communicate clearly and succinctly the information needed to make a decision about the preferred alternative. Make a decision, or review a previously made decision, about which alternative solution is preferred, based on the analysis of benefits and costs performed in the preceding activities.

- Entry Criteria:**
- Initial estimates of benefits and costs have been made
 - A comparison of alternatives has been made
 - Sensitivity analysis, if necessary, has been completed

Roles	Tasks
Customer Representative, Project Manager	<ul style="list-style-type: none"> • Organize the completed analysis information into a presentation • Present the results of the benefits and costs analysis
Steering Committee, Senior Management	<ul style="list-style-type: none"> • Decide on the preferred solution • Document the decision

- Exit Criteria:**
- A decision has been made and documented about which alternative decision is preferred

6. MEASURES OF THE BENEFITS AND COSTS ANALYSIS PROCESS

Measures that can be used to track and manage benefit and cost analysis activities include the following.

- Effort required – compare the amount of effort to what was expected
- Number of alternatives evaluated and presented
- Number of preferred alternatives requiring changes after project initiation

7. VERIFICATION ACTIVITIES

During benefits and costs analysis, the following verification activities are appropriate for management:

- Review the assumptions and constraints being used in determining benefits and costs.
- Review the project objectives for completeness and alignment with organization goals.
- Review the results of the benefits and costs analysis.

The following verification activities are appropriate for Quality Assurance:

- Review the estimates of benefits and costs to ensure accuracy and consistency.
- Review the results of sensitivity analysis, if performed.
- Review the comparison of alternatives to ensure objectivity in evaluation and ranking.

8. DOCUMENT CONTROL

Revision	Date	Description
0.1	12/07/99	First draft; for internal review
0.2	12/07/99	Incorporate internal review comments
1.0	2/1/00	Incorporate Advisory Group revisions

A. ADDITIONAL RESOURCES

Benefits and Costs Analysis Bibliography

“Analysis of Benefits and Costs (ABC's) Guideline, Volume 1: A Manager's Guide to Analysis of Benefits and Costs”, U.S. Department of Energy Assistant Secretary, Management and Administration Directorate of Administration Office of ADP Management, June 1988

“Analysis of Benefits and Costs (ABC's) Guideline, Volume 2: An Analyst's Handbook for Analysis of Benefits and Costs”, U.S. Department of Energy Assistant Secretary, Management and Administration Directorate of Administration Office of ADP Management, June 1988

Shtub, Avraham, Jonathan F. Bard, and Shlomo Globerson. *Project Management: Engineering, Technology, and Implementation*. Englewood Cliffs, NJ: Prentice Hall, 1994, pp. 117-126.

B. SUPPORTING TEMPLATES

(Note: Please refer to “How to Prepare the Biennial Operating Plan” for a detailed discussion of cost factors and requisite forms for entering the data collected by this process.)

Please see the following items, accessible separately:

- **Example Evaluation Charts** –templates for documenting the prioritization of benefits, the comparison of alternative solutions, and the results of sensitivity analysis
- **Potential Categories of Benefits For IRM Projects** – a list of possible categories which may help to identify benefits

C. SUPPORTING CHECKLISTS

Please see the following checklists, accessible separately:

- **Benefits and Costs Checklist** - a checklist for use in evaluating the results of benefits and costs analysis